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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,815	06/23/2003	Wolfgang Franz Eckl	8-20-3	9847

7590

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Docket Administrator (Room 3J-219)  
Lucent Technologies Inc.  
101 Crawfords Corner Road  
Holmdel, NJ 07733-3030

EXAMINER

HANNON, CHRISTIAN A

ART UNIT PAPER NUMBER

2618

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/601,815	<b>Applicant(s)</b> ECKL ET AL.	
	<b>Examiner</b> Christian A. Hannon	<b>Art Unit</b> 2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 February 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

This action is response to applicant's response filed on 02/21/2006. Claims 1-18 are now pending in the present application. **This action is made final.**

#### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 16 & 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16 recites the limitation "the variable connector" in the first line of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim 18 recites the limitation "the variable connector" in the first line of the claim. There is insufficient antecedent basis for this limitation in the claim.

#### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-3, 5, 6 & 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Perrott (US 6,856,206).

Regarding claim 1, Perrott teaches a device for high-frequency and/or radio-frequency tuning comprising within one IC-package a first variable capacitor (Figure 4A, Item 412; Column 5, Lines 18-20; Perrott) and at least one second fixed capacitor (Figure 4B, Item 452; Column 6, Lines 15-18; Perrott), at least one signal path connected to the first variable capacitor (Figure 4A, Item V-out; Perrott) and providing at least one input and one output signal port, and at least one controllable switching means for individually connecting and disconnecting said at least one second fixed capacitor into the signal path or from the signal path, in parallel to the first variable capacitor (Column 5, Lines 6-63; Perrott). It is further noted that the examiner is interpreting the array of soft-switched capacitors in figure 4A to comprise a 'first variable capacitor' as the capacitance of the array 412 is in fact variable. While the second array of digital capacitors item 416, in figure 4A is shown in further detail in figure 4B as an array of fixed capacitors that are individually switchable.

Regarding claim 2, Perrott teaches the device of claim 1, further comprising at least one control path, isolated from the signal path into which the at least one second capacitor is connectable, for controlling at least one of the switching means and the first

variable capacitor (Column 5, Lines 49-51; Figure 2, Item "digital and soft switch cap settings"; Perrott).

Regarding claim 3, Perrott teaches the device of claim 2, wherein the at least one control path comprises means for digitally controlling a plurality of switching means individually (Column 6, Lines 7-9; Perrott).

In regards to claim 5, Perrott teaches the device of claim 1, wherein the switching means comprises an actuator for driving a contact element of the switching means to close or open the switching means (Column 5, Lines 44-51; Perrott). The examiner is interpreting the transistor to serve as an actuator in order to effect a switch that closes and opens.

Regarding claim 6, Perrott teaches the device of claim 1, wherein the switching means and at least the first variable capacitor respectively comprises an actuating mechanism based on at least one of an electrostatic, piezoelectric, thermal, magnetic and bi-metallic actuator functionality. It is inherent that a capacitor & and a transistor effect change by use of electrostatic forces.

In regards to claim 15, Perrott teaches a device for high frequency and/or radio frequency tuning comprising within one IC-package: a variable capacitor connected in a signal path between input and output signal ports (Figure 4A, Item 412; Column 5, Lines 18-20; Perrott), a plurality of fixed capacitors arranged in parallel with the variable capacitor and with each other (Figure 4B, Items 452,454,456 etc.; Column 6, Lines 15-18; Perrott), and a plurality of switches for individually connecting and disconnecting the

Art Unit: 2618

fixed capacitors into and out of the signal path (Figure 4B, Items 462, 464, 466 etc.; Perrott).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Perrott in view of Tham et al (US 5,880,921).

Regarding claim 4, Perrott teaches the device of claim 1, further comprising at least two second fixed capacitors. However Perrott fails to teach that the capacitors are arranged in a logarithmic scale, and wherein the first variable capacitor at least is adapted to match the lowest range of the logarithmic scale. Tham et al teach that a capacitor bank may be arranged in a logarithmic scale (Column 1, Lines 40-42; Tham et al). It would have been obvious to arrange the two second capacitors in Perrott in a logarithmic scale, such as that taught by Tham et al, in order to achieve a non-linear capacitive bank. Furthermore since Perrott teaches a variable first capacitor this capacitance could be any capacitance and therefore reads on the limitation that it is at least adapted to match the lowest range of the logarithmic scale.

7. Claims 7, 8, 12, 13, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perrott in view of Shamsaifar et al (US 2003/0132820), herein Shamsaifar.

Regarding claim 7, Perrott teaches the device of claim 1, however Perrott fails to teach wherein at least one controllable switching means is produced as MEMS rf-switch means, and the at least first variable capacitor is produced as MEMS varactor. However Shamsaifar teaches that at least one controllable switching means is produced as MEMS rf-switch means (Page 3, [0039]; Shamsaifar) and that at least first variable capacitor is produced as a MEMS varactor (Page 5, [0057]; Shamsaifar). It would have been obvious to combine the MEMS varactor of Shamsaifar with the teachings of Perrott in order to reap the benefit of the higher Q factor for use in Perrott's first variable capacitor.

In regards to claim 8 Perrott teaches the device of claim 1, however Perrott fails to explicitly teach that the device is produced by using a Micro Electro-Mechanical-Systems technology. Shamsaifar teaches a device produced by using a MEMS technology (Page 1, [0011]; Shamsaifar). It would have been obvious to combine the teachings of Perrott and Shamsaifar in order to improve the Q factor involved with the capacitance of Perrott through MEMS.

With respect to claim 12, Perrott teaches the device of claim 1, however Perrott fails to teach wherein at least the first variable capacitor comprises an actuator for driving a movable element of said variable capacitor to vary the effective area thereof. Shamsaifar teaches a variable capacitor comprising an actuator for driving a movable

element of said variable capacitor to vary the effective area (Page 5, [0057]; Shamsaifar). It would have been obvious to include an actuator to vary the capacitor in Perrott with the teachings of Shamsaifar, to implement a higher Q factor regarding the capacitor.

Regarding claim 13, Perrott and Shamsaifar teach the device of claim 12, furthermore Shamsaifar further teach wherein at least the first variable capacitor comprises an actuator for driving a movable element of said variable capacitor to vary the effective area thereof by changing the distance between at least two plates (Page 5, [0057],[0059]; Shamsaifar).

In regards to claim 16, Perrott teaches the device as claimed in claim 15, however Perrott fails to teach wherein the variable connector and switches are MEMS apparatus. Shamsaifar teaches that a varactor can be implemented with MEMS (Page 5, [0057]; Shamsaifar). Obvious to one of ordinary skill in the art a diode acts as a switch. Therefore it would have been obvious to combine the teachings of Perrott with those of Shamsaifar in order to improve the Q factor of the diode switch.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Perrott in view of Damgaard et al (US 2002/0168038), herein Damgaard.

Regarding claim 9, Perrott teaches the device of claim 2, however fails to teach wherein the at least one control path is connectable to one of at least an EPROM, ASIC or FPGA. However, Damgaard teaches a tuning circuit that is capable of connecting to an EPROM, ASIC or FPGA (Page 3, [0026]; Damgaard). Therefore it would have been



Art Unit: 2618

obvious to implement a EPROM, ASIC or FPGA as a means to control the digital and soft switch cap settings of Perrott.

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Perrott in view of Shamsaifar as applied to claim 12 above, and further in view of Prophet (US 2003/0146464).

Regarding claim 14, Perrott and Shamsaifar teach the device of claim 12, however they both fail to explicitly teach that the first variable capacitor comprises an actuator for driving a movable element of said variable capacitor to vary the effective area thereof by the degree of engagement of fingers of a comb like structure. Prophet teaches a MEMS capacitor comprising an actuator for driving a movable element of said variable capacitor to vary the effective area thereof by the degree of engagement of fingers of a comb like structure (Page 2,[0025]-[0027]; Prophet). IT would have been obvious to combine the teachings of Prophet with those of Perrott and Shamsaifar in order to reduce stiction in the circuit.

10. Claims 10, 11 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perrott.

Regarding claim 10, Perrott teaches the device of claim 2, however Perrott does not explicitly teach wherein the at least one control path for controlling at least the first variable capacitor is adapted to be controllable via an analogue control signal. However Perrott does teach the use of an analog controllable variable capacitor via an analogue

Art Unit: 2618

control signal (Column 5, Lines 13-17; Perrott). Therefore it would have been obvious to implement the first capacitor as an analogue controlled analogue capacitor in order to save power restraints necessary to implement an A to D conversion to keep the signal in the digital domain.

In regards to claim 11, Perrott teaches the device of claim 10, furthermore Perrott teaches that an analog signal can be derived from a D to A converter (Column 4, Lines 36-37; Perrott).

With respect to claim 17, Perrott teaches the device of claim 15, wherein the switches are controlled using a digital control signal (Column 5, Lines 49-51; Perrott), however Perrott does not explicitly teach wherein the capacitance of the variable capacitor is controlled using an analogue control signal. However Perrott does teach use of a analog control signal to control a variable capacitor (Column 5, Lines 13-17; Perrott), therefore it would have been obvious to combine embodiments within Perrott in order to save power restraints necessary to implement an A to D conversion to keep the signal in the digital domain.

### ***Response to Arguments***

11. Applicant's arguments with respect to claims 1-8 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian A. Hannon whose telephone number is (571) 272-7385. The examiner can normally be reached on Mon. - Fri. 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nay Maung can be reached on (571) 272-7882. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2618

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Christian A. Hannon  
May 2, 2006



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PRIMARY EXAMINER